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Cost of Capital for Cross-Border Investment: The Role of Marginal and Intra-marginal Profits

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Abstract

We model an investment in a foreign subsidiary, the outside finance to which is injected by its parent company from abroad. Sinn's (1993) initial "underinvestment" problem due to taxes on repatriated dividends is argued to also concern all follow-up investments of the subsidiary financed from its marginal profits that represent the required return on the initial investment. The dividend tax capitalization hypothesis in the international context, or the Sinn-Hartman neutrality theorem, is valid only if the initial investment generates intra-marginal profits and concerns their reinvestment, the returns of which are repatriated dividends.

The results reveal that the ownership structure of the parent and the consequent tax preference for dividends affect foreign source intra-marginal profits differently from domestic source ones. In particular, the cost of capital for foreign intra-marginal profits is *inversely* affected by the home-country dividend tax.

We calibrate the cost of capital formulae to the parameter values of the Estonian and Finnish systems of taxing international investment income. The calculations show that the Estonian subsidiaries, paying no tax on undistributed profits but a corporate dividend tax, offer tax benefits to their parent companies only by their intra-marginal profits.

JEL codes: H25, H32, H87

1. Introduction

Tax havens attract funds because of their low or non-existent accrual-based taxes on income from capital, but usually have no productive investment opportunities inside their own jurisdictions. The funds under management in a tax haven must ultimately be invested outside its borders. Source-based taxation of accruing income from productive activities would thus guarantee the same effective level of taxation in the world whether claims on such activities are owned directly by non-taxed institutions as pension funds or by tax-paying residents via their investment vehicles in tax havens; see Kari and Ylä-Liedenpohja (2002) for a recent discussion.

Estonia is different. She has a rapidly developing economy with growing investment opportunities in productive capital, but no corporation tax on undistributed profits. Only distributions are taxed at a rate of 26 per cent on pre-tax profit or 26/74 = 0.3514 on post-corporation tax dividend. The same tax rate applies to all income, monetary or in-kind, running from the corporate to the household sphere. Repatriations of realization gains on Estonian business assets of which real estate comprises at least 75 per cent in book value terms are regarded as distributions and are taxed accordingly in Estonia.

The Estonian approach to tax corporations may be viewed as a tax holiday without a definite length in contrast to the well known Irish case and the experiments by the Central-East European countries. The incentive effects of the Estonian application seem, however, different from those of a typical tax holiday arrangement. The investment in Estonia benefits primarily from the deferral of the tax payment, without offering tax shields in the form of interest deductibility or accelerated tax depreciation allowances. Repatriation of Estonian-source income become relevant only after the multinational has exhausted investment opportunities therein. The shares of an Estonian subsidiary may change ownership. The initial owner may thus “repatriate” the accrued capital in the country where the legal ownership of the subsidiary lies without any effect on the investment incentives in Estonia. How such a deferral period is taken into account when applying the standard cost of capital approach is one of the main motivations for this study.

Corporation tax is eventually paid at a regular rate in a traditional fixed length tax holiday, implying no effect on the steady-state cost of capital. Even the temporary incentive effects of the tax holiday itself may be nullified if the parent company is in the country that credits

foreign taxes against the domestic tax on foreign-source income, implying that foreign income will in the end be taxed in the home country and that tax holiday only shifts tax revenue from the foreign country (f-country) to the home one; see Mintz and Tsiopoulos (1994) for a thorough analysis on the issues. If the home country (h-country) of the parent company exempts foreign-source income from the domestic tax, tax holiday arrangements may encourage migrant industries to settle only for the period of tax holiday, which the Estonian system avoids.

Popular debate often labels Estonia as a tax haven[1] because savings grow untaxed within its business sector. We scrutinize this claim more closely within the standard trapped equity approach of applied tax theory, extended to the multinational framework. The key of the trapped equity argument is the capitalization of all dividend taxes in the share price at the moment of retaining and investing one euro of post-corporation tax profit. Therefore, dividend taxes are unavoidable. They are paid whether profits are distributed or retained.

In the case of repatriation of income from Estonia, the "dividend tax" contains (i) the Estonian corporation tax on distributions in the Estonian subsidiary[2], (ii) any repatriation tax in the form of the parent company tax exceeding the Estonian corporation tax in a country applying the credit method to taxation of foreign-source income, (iii) equalization tax on onward distributed foreign-source income in a country applying exemption to foreign-source income, but having the imputation system, and (iv) the shareholders' dividend tax differential (including possible imputation credits) compared to their effective capital gains tax rate. Equalization tax guarantees that any home-country destination dividends are taxed in the home country at the same rate as the rate of imputation. [3]

This approach makes it possible to value consistently the opportunity cost of profits generated in the home country of the parent and in the host countries of its foreign

[1] According to the IMF 2004 country report, the ratio of tax revenue to GDP varied between 30.7 and 32.9 per cent in 1999-2003, and non-tax revenues of general government between 3.1 and 4.4. per cent. On this count Estonia hardly classifies a tax haven.
[2] In case of portfolio dividends an additional withholding tax is levied by Estonia as allowed by the bilateral tax treaties.
[3] Equalization tax is, however, different from other dividend taxes because it is avoidable by the parent company, by transforming foreign profits via home-country investments or via transfer pricing into home-country taxed profits which are distributable without equalization tax (Kari and Ylä-Liedenpohja 2005). Equalization tax may thus change the parent's investment incentives while not affecting those of its f-country subsidiary.

subsidiaries, but repatriated to the home-country and used to finance investment projects in Estonia in addition to profits generated therein. Next section presents the no-profit arbitrage condition for cross-border real investment, the basis of the derivation of the cost of capital formulae in section 3 and their numerical illustrations in section 5.

Our modelling is general and applicable to any country hosting subsidiaries the outside financing of which relies on funding from abroad. The analysis emphasizes the initial entry investment, whether tax factors affect its desirability over staying at home. The reference profitability is the same post-parent corporation tax level for both the entry investment and the home country investment as determined by arbitrage in the international financial markets. Our approach is related to Sinn's (1993). He studies an explicit dynamic model that assumes the investment opportunities to be given at the time of entry investment, and finds the parent to underinvest in the subsidiary due to the tax on repatriated dividends. We stay within the static framework, but assume ad hoc new investment opportunities to emerge along the passage of time.

Section 3 starts from the problem how the deferral of profit repatriations is taken into account when implementing standard cost of capital formulae for the f-country investment, separating the f-country investment from marginal and intra-marginal profits therein. The implications of the latter distinction for the validity of the trapped equity argument are briefly spelled in section 4. Section 5 contains numerical illustrations on the deferral benefit of the zero tax on undistributed profits in Estonia compared to equivalent projects in the home country of the multinational.

In the calculations we assume the parent companies to be either listed or non-listed (closely-held). Dividends distributed by the former are regarded as income from capital and are taxed at a flat rate. Dividends from the latter are divided by a splitting rule to a maximum amount that is taxed as income from capital at a flat rate and to earned income that is taxed at progressive marginal rates. This is the so-called Nordic dual income tax analysed by Lindhe, Södersten and Öberg (2002) and by Kari (1999) in the Finnish case. In the end, we shall consider four different ownership structures of the parent companies. The home country is assumed either to exempt or to apply the credit method to foreign-source income in the taxation of parent companies. The ownership structures cover both

classical corporation tax and the imputation system with an equalization tax as alternative means of taxing domestic-destination dividends.

Section 6 summarises the results. The ownership structure of the parent and the consequent tax preference for dividends is shown to affect foreign source intra-marginal profits differently from domestic source ones. In particular, the cost of capital for foreign intra-marginal profits is *inversely* affected by the home-country dividend tax. Our analysis does not support the view of Estonia as a tax haven for investment funds originating outside Estonia. The Estonian subsidiaries offer tax benefits to their parent companies only by their intra-marginal profits. No other clear deferral benefits are found as is the standard thinking of realization based taxation of capital gains.

2. Investment arbitrage

Consider an investment by the parent company in its corporate foreign subsidiary. Such an investment must, at the margin, earn a pre-tax real rate of return MRR^f that covers all the taxes from the f-country corporation tax, the repatriation phase tax from the subsidiary to the parent, the possible tax of the onward distribution phase and the parent's equity- and bondholders' taxes so that the investors are at least as well off as investing the opportunity cost of the funds on their own account:

(1) $$\hat{\theta}_i(1-\delta_j)(1-\tau_j^f)(MRR^f+\pi)=\rho_i\gamma_i$$

where

γ_i = the opportunity value of the investors' funds of type *i* at the parent's disposal

ρ_i = the pre-tax nominal, risk-adjusted rate of return earned by the investors on the funds of type *i* in financial markets

π = the f-country rate of inflation

τ_j^f = the f-country rate of corporation tax on income of type *j*

δ_j = the combined rate of the f- and h-country taxes on repatriated income of type *j*

$\hat{\theta}_i$ = the pre-tax income of type *i* to the investors resulting from a euro of post-parent company taxes, including the effect of the possible equalization tax

The type *i* funds fall into four categories: the proceeds from either a) new share issues or b) bond issues by the parent, both of which have $\gamma = 1$, and the accumulated, undistributed c) domestic or d) foreign-source profits, the opportunity cost of which may differ from $\gamma = 1$ due to the effective differential dividend tax over the capital gains tax rate according to the tax capitalization view.[4]

The parent's funds can be invested in the f-country either in the form of outside equity or debt. The type j income earned in the f-country is thus either profits on equity or interest[5] on debt, *j = b*. Profits can be repatriated as dividends, *j=d*, or retained and invested in the f-country, *j=R*. The latter entails an opportunity value γ^f, different from the one of the h-country source profits γ^h due to repatriation taxes. The parent can also sell its f-country subsidiary and by that means "repatriate" the f-country undistributed profits in the country of legal ownership of the f-subsidiary.

Expression (1) is general enough to include the case where the parent invests in the home country, with superscript *f* replaced by *h* and with δ_j equal to zero. Expression (1) can also be expanded to include the possibility that a third country (t-country) is the source of the investible funds as well as the ownership country of the subsidiary, with respective γ^t adjusted to accordingly reflect the repatriation tax from the t- to the h-country; see Kari and Ylä-Liedenpohja (2003) for details.

We depart in (1) from the standard public finance approach for cost of capital in two respects. First, relation (1) is defined in terms of post-corporation tax, but pre-investor level taxes. Second, an adjustment for risk is made in ρ_i, the risk premium for equity being different from debt. Our assumption is that ρ_i is the world market return in arbitrage equilibrium. This corresponds to the r-equilibrium in the King-Fullerton (1984) (KF) jargon. We adopt the corporate finance approach that such a rate of return is determined and

[4] Arbitrage equilibrium between dividend income and capital gains implies for the opportunity cost of h-country retained profits is $\gamma^h = (1-\tau_d)/(1-\tau_g)$ where τ_d is the rate of dividend tax and τ_g the rate of capital gains tax of a representative investor.

[5] If interest expenses are deductible, $\tau_b^f = 0$ holds, and if they are not, τ_b^f equals the statutory τ^f.

observed by the class of claims, equity and debt. In the KF-literature, the r-equilibrium is assumed to take place in arbitrage via real projects.

The derivation of the standard cost of capital formulae from (1) implies that all tax rates are accrual-based. The most straightforward is the effective tax rate of interest income. If the subsidiary is financed by debt from the parent, its interest income is repatriated and taxed every year at the corporation tax rate of the parent. It is a tax on nominal interest income which raises the effective tax rate on real interest income above the legal one. Such an effective tax rate, δ_b in the notation of condition (1), is the ratio of the tax on nominal interest income to the real interest income repatriated, and condition (1) obtains the form

$$\hat{\theta}_d(1-\delta_b)(MRR^f+\pi)=\rho_E\gamma^h \qquad (2)$$

where the source of funds is assumed to be the domestically taxed profits of the parent, valued at γ^h by the market, and where subscript *d* stands for dividends, and *E* for equity. Thus ρ_E is the required rate of return on equity. The cost of capital MRR_D^f is then directly solved from (2), where subscript *D* stands for debt financing. This gives a benchmark cost of capital for the subsidiary without the parent benefitting from the deferral of foreign profit repatriations or being penalized by taxes on cumulative inflation-caused gains.

3. Marginal and intra-marginal profits

The trapped equity approach to the arbitrage condition (1) assumes that the post-corporation tax profits of the mature foreign subsidiary will be repatriated as a continuous dividend stream up to the eternal future. Because of emerging investment opportunities and non-taxed undistributed profits in Estonia, the parent company may find it advantageous to reinvest the profits therein. Dividend payments are therefore deferred until the parent starts to repatriate them. The deferral period is taken into account by compounding the required dividend stream at the rate ρ_E to a future date[6] *n*, when dividend repatriations are assumed to start. Thus the deferral of dividend repatriation increases the size of the future dividend stream on the marginal entry investment at time

[6] In a full model date *n* is optimized subject to the profitability of the future investment opportunities.

t=0 due to the reinvestment of its profits. During this period the investors earn capital gains from the entry investment, at the rate ρ_E, the cost of equity injected by the parent.[7]

Specifically, let us assume that the subsidiary has exhausted its investment opportunities at date *n* and thereafter sends its whole real profit to the parent. Define

A = the cost of an asset acquired with the initial equity injection at date *0*, and

g = the average rate of real post-tax profits retained and reinvested at source.

The book value of the asset then grows at the average nominal rate of ($g+\pi$), where π is the average rate of f-country inflation, having a value of $Ae^{(g+\pi)t}$ at time *t.* The remitted, real post-corporation tax profit at time *n* will be $gAe^{(g+\pi)n}$. But, part of this dividend stream is due to the initial equity A to the f-country from the h-country taxed profits. Their opportunity cost to the investors is $\gamma^h A$. Repatriation taxes on such dividends, in the lhs of the arbitrage condition (1), do not reflect in γ^h and therefore do not cancel out.

Hence, such a dividend stream at date *n* must satisfy from (1) the following, required real rate of return ρ_E-*p* on the compounded nominal equity, with *p* standing for the rate of world inflation

(3) $$\hat{\theta}_d(1-\tau_d^f)gAe^{(g+\pi)n} = (\rho_E - p)\gamma^h Ae^{\rho_E n}$$

It can be solved for $g=g_A^*$ and further for the cost of capital MRR_A^f from condition (A1)[8] of Appendix, with subscript *A* standing for the initial equity injection. The real rate of asset growth g_A^* of the entry investment due to the follow-up investments of the f-country post-corporation tax profits thus gives the minimum that satisfies the real rate of return in the financial market.

Also, we conclude from (3) that repatriation taxes affect whether $\hat{\theta}_d(1-\tau_d^f)$ is less than one and that any reinvestment of the f-country post-tax profits that represent the required return on the initial entry investment do not belong to the sphere of the international

[7] This is a general property of dynamic investment models in which the investors earn their return as capital gains during the growth period with no dividend pay-outs until profitability starts to constrain growth when profits are used both for distributions and investments (Ylä-Liedenpohja 1978).

[8] The proper rate of corporation tax is now τ_d^f in (A1).

trapped equity argument. The repatriation taxes on such profits drive up the pre-tax cost of capital for the initial investment. Thus the initial "underinvestment" due to the repatriation taxes (Sinn 1993) concerns also the cost of capital of all follow-up investments which are financed from the post-tax profits, representing the required return on the initial equity.

Only if the real asset growth g exceeds the required g_A*, that is, the initial investment is value creating and generates cash flows in excess of a zero net present value project, the standard tax capitalization hypothesis applies. The opportunity cost of each euro of intra-marginal profits reinvested in the f-country is γ^f in (1). The repatriation taxes on such post-tax f-profits capitalize into their market value γ^f when reinvested in the f-country as was originally observed by Sinn (1984) and Hartman (1985). That is, the following holds

(4) $$\gamma^f = \hat{\theta}_d (1 - \tau_d^f) \gamma^h$$

Thus the repatriation tax component cancels out in (1), and we are left from (1) with a standard cost of capital

(5) $$MRR_R^f = \frac{\rho_E \gamma^h}{1 - \tau^f} - \pi$$

where subscript R stands for retained and reinvested intra-marginal profit.[9] This form of the cost of capital for intra-marginal retained f-country profits shows that, though we are explicitly in the tax capitalization framework, the h-country dividend tax affects the pre-tax cost of capital of such foreign funds an thus extends the Sinn-Hartman neutrality theorem. The company can estimate from stock market data ρ_E, the required rate of return on its shares, as well as γ^h, the financial markets' tax preference for its dividends,[10] the latter

[9] In the Estonian case $\tau^f = 0$ holds naturally. Though in a unconventional form, formula (5) is a standard one indeed. Remember that ρ_E is defined as the required, nominal pre-personal tax rate of return on equity. If *r* is the corresponding post-tax rate of return, $\rho_E = r/(1 - \tau_d)$ holds where τ_d is the rate of dividend tax. Because the dividend tax is also deducted from the opportunity cost of the invested funds, i.e. $\gamma^h = (1 - \tau_d)/(1 - \tau_g)$ where τ_g is the rate of capital gains tax, dividend tax cancel out and the conventional form $MRR_R = r/(1 - \tau_g)(1 - \tau^f) - \pi$ obtains.

[10] Financial economics has taught the estimation of these two parameters for almost four decades.

being affected by dividend tax. Formula (5) implies that, everything else given, the higher is the opportunity cost of retained h-country intra-marginal profits, γ^h, meaning the *lower* is the owners' dividend tax rate, the higher is the pre-tax cost of capital for intra-marginal retained profits MRR_R^f in the f-country subsidiary of the multinational.

Let us finally consider the problem when the parent company sells its f-country subsidiary when it reaches a mature state at date *n*. The subsidiary has generated post-tax profits at the real rate of g. Therefore, its remitted future real dividend stream, net of the repatriation taxes, capitalized at the real discount rate (ρ_E-*p*), is the sum that the buyer is willing to pay for its shares, or

(6) $$\frac{\hat{\theta}_d(1-\tau_d^f)gAe^{(g+\pi)n}}{\rho_E - p}$$

The seller's reservation price *S* before corporation tax[11] is determined by

(7) $$S - \tau^h(S-A) = \gamma^h Ae^{\rho_E n} + \gamma^f\left[(g+\pi)A\int_0^n e^{(g+\pi)t}e^{(\rho_E-p)(n-t)}dt - \gamma^h A(e^{\rho_E n}-1)\right]$$

where the lhs is the post-h-country-corporation tax realization price. The first term on the rhs is the value of the initial f-country equity to the owners compounded at their required rate of return, that is, including the reinvested marginal profits. The second term is the accumulated intra-marginal profits in the f-country up to date *n* and valued at γ^f, that is, the required real return on all nominal profits reinvested minus the reinvested marginal profits. Carrying out the integration and solving for *S*, we obtain

(8) $$S = \frac{1}{1-\tau^h}\left\{(1-\gamma^f)\ \gamma^h Ae^{\rho_E n} + \gamma^f\ \frac{(g+\pi)A}{g+\pi-\rho_E+p}\left[e^{(g+\pi)n} - e^{(\rho_E-p)n}\right] + (\gamma^f\gamma^h - \tau^h)A\right\}$$

Hence condition (8) must equal (6) in equilibrium for the trade sale to occur. Collecting all terms containing g to the lhs, we obtain

[11] Below we carry out calculations also on the assumption that realization gains from the shares of the subsidiary are tax exempt, i.e. τ^h=0 holds true in (7).

(9) $$\frac{\hat{\theta}_d(1-\tau_d^f)gAe^{(g+\pi)n}}{\rho_E - p} - \frac{1}{1-\tau^h}\left\{\gamma^f \frac{(g+\pi)A}{g+\pi-\rho_E+p}\left[e^{(g+\pi)n} - e^{(\rho_E - p)n}\right]\right\} =$$

$$\frac{1}{1-\tau^h}\left\{(1-\gamma^f)\ \gamma^h Ae^{\rho_E n} + (\gamma^f\gamma^h - \tau^h)A\right\}$$

This can be solved for $g = g_S^*$ and further from (A1) for MRR_S^* to give the required real asset growth and the required pre-tax real rate of return on assets in the f-country in the case the profits from the initial investment are "repatriated" by realizing the shares of the subsidiary in a trade sale, subscript *S* standing for trade sale.

4. Implications for interpretations

Figure 1 illustrates our approach. An expanding economy implies a gradual shifting of the investment opportunity schedule, i.e. Keynes's marginal efficiency of investment, over time from the initial position MRR_A at time *t=0* to the steady-state one MRR_n. The subsidiary invests initially up to K_A^* and in the steady-state up to K_n^* because of the lower opportunity cost of intra-marginal profits $\gamma^h < 1$ due to the capitalization of dividend tax.

--- Insert Figure 1 approx. here ---

The approach has a number of implications for the tax capitalization hypothesis. The first concerns interpreting empirical evidence. The well-known studies of Poterba and Summers (1983,1985) lend support to the traditional view of corporation finance and taxation. Investors value a profit dollar in the tills of a corporation equal to the one in their pockets and, therefore, the marginal source of investment finance is the proceeds from new share issues. If the major fraction of profits earned and reinvested are in fact marginal rather than intra-marginal, the evidence tilts naturally in favour of the traditional view in contrast the tax capitalization one. The distinction between intra-marginal and marginal profits may reconcile the results of Auerbach and Hasset (2003), who find the marginal source of investment funds of mature companies to be retained profits, in respect of Poterba and Summers (1983, 1985).

By the same argument, one should also weigh the double-tax cost of capital not only with the share of new share issues, but also with the share of reinvested marginal profits[12] to get a King-Fullerton (1984) kind of overall tax wedge of marginal investment in an economy.

The final implication concerns tax policy. The tax capitalization view, according to which dividend tax is not relevant for investment decisions because it is deducted in the opportunity cost of reinvested profits as well as in the net returns of such investments, may have much less relevance for the cost of capital of mature companies[13] since the profits retained and reinvested by such companies tend principally to be marginal ones, enough to satisfy the required rate of return on investors' equity injections.

5. Numerical illustrations for the case of Estonia

The key parameters are those contained in (1), the world capital market equilibrium condition. The recent estimate of Dimson et al. (2002) for the real geometric average rate of return on the U.S. equities is 6.7 per cent per annum. We adopt it as a world market equilibrium rate of return. It also fulfils the often cited rule of thumb that the price/earnings multiple PE=15 holds true in the long run equilibrium. An asset yielding 0.067 EUR per year in perpetuity is valued at 1 EUR in the financial markets. Adding two percentage points as an equilibrium rate of inflation to it, the following parameter values are used:

ρ_E-p	= 0.067	= the required real rate of return on equity
p	= 0.02	= the world rate of inflation
ρ_E	= 0.087	= the required nominal rate of return on equity
π	= 0.025	= the rate of inflation in the f-country, being higher than p due to the Balassa-Samuelson effect
τ^f	= 0	= the f-country rate of corporation taxes on retained
τ_d^f	= 0.26	and distributed profits
τ^h	= 0.29	= the h-country rate of corporation tax

[12] How estimate such a share is of course a research problem *per se*.
[13] In contrast, Auerbach and Hassett (2003) defend the tax capitalization cost of capital on the basis of their finding cited above.

We assume four different ownership structures[14] of the parent company as reflected by market valuation of dividends and retained profits. In addition, we differentiate them on the basis whether equalization tax is paid or not. Define u_j = the rate of equalization tax on type *j* income and *u* = the rate of imputation. Hence, the pre-tax dividend is

$\hat{\theta} = (1-u_j)/(1-u)$, when equalization tax is paid and imputation credit is granted, and

$\hat{\theta} = 1/(1-u)$, when equalization tax is not paid, but imputation credit is granted

The cases are:

(i)	$\hat{\theta} = \gamma^h = 1$	holds true for companies dominated by international and domestic tax-exempt institutional investors which are not entitled to imputation credits, even if distributions are from taxable h-country income, neither is it paid by the distributing company if distributions are from tax-exempt f-source income
(iia)	$\hat{\theta} = \gamma^h = 1.408$	holds true for companies owned principally by taxable domestic household and corporate investors receiving imputation credits at the rate of corporation tax, when distributions are from taxable h-country income
(iib)	$\hat{\theta} = 1,\ \gamma^h = 1.408$	holds true for the same owners if distributions are from tax-exempt f-source income, because equalization tax is paid
(iii)	$\hat{\theta} = \gamma^h = 1.15$	holds true for companies with the average mixture of taxable domestic investors and international investors
(iva)	$\hat{\theta} = 1.408$ $\gamma^h = 0.95$	holds true for closely-held companies owned by domestic households the marginal dividends of which are taxed as earned income (Kari 1999, Lindhe et al. 2002)[15] when distributions are from taxable h-country income
(ivb)	$\hat{\theta} = 1,\ \gamma^h = 0.95$	holds true for the same owners if distributions are from tax-exempt f-source income, because equalization tax is paid

The cases (i), (iii) and (ivb) are equivalent to a classical system of corporate taxation.

[14] Kari and Ylä-Liedenpohja (2002) discuss shortly both theoretical models and empirical evidence of how different ownership mixes affect valuation of dividends and retained profits in market equilibrium. Case (iii) relies on the most recent evidence about the Helsinki Stock Exchange by Vilkman (2002) and corresponds to their theoretical values after the Finnish tax reform from 2005 onward. Case (iv) assumes that dividends are taxed as earned income at the rate of 0.52, their average marginal tax rate in recent years according to the statistics by the National Board of Taxes and that the effective rate of capital gains equals to 0.29 which is also the rate of imputation.

[15] The derivation of a benchmark project for this owner category is beyond the scope of this paper due to the complexity of the issue. In the case of the subsidiary cost of capital this owner category is more straightforwardly analysed because the reinvestment of f-country profits does not increase the net asset value of the parent company, the basis of splitting dividends into capital and earned income.

The crucial formulae to calculate the required rates of asset growth are (3) for g_A and (9) for g_S*. We notice that $\hat{\theta}$ and γ^h enter symmetrically formula (3), but not so formula (9) in the case of the f-country subsidiary.

First, we calculate the cost of capital for the following benchmark projects (Table 1). The first row of Table 1 has $\gamma^h = 1$ in each case (i)-(iii) and clearly shows how the imputation system leads to the lowest (pre-corporation tax) cost of outside equity for those companies which raise their finance from domestic taxable investors only, because such investors (ii) benefit fully from the imputation credit.[16] The higher cost of capital for intra-marginal profits[17] than for new share issues with ownership structures (iia) and (iii) derives from the full double taxation of such profits. Yet, there are no differences across the ownership structures because of the symmetric effect of $\hat{\theta}$ and γ^h on MRR_R^h according to the tax capitalization hypothesis.

Investment in	Financed by	Inflation rate p	Ownership structure (i)	(iia)	(iii)
h-country	new share issues	0.02	0.103	0.067	0.087
h-country	intra-m. profits (1)	0.02	0.103	0.103	0.103
h-country	new share issues	0	0.094	0.067	0.082
h-country	intra-m. profits (1)	0	0.094	0.094	0.094

Table 1. *Cost of capital MRR^h for benchmark investment projects*

Second, we derive the required rate of real asset growth and the cost of capital MRR^f for the Estonian subsidiary the riskiness of which corresponds to the market average. The source of funds by the parent to its subsidiary is thought to be fully taxed domestic profits of the parent.

[16] The entries of the first row are $MRR^h = \rho_E / \hat{\theta}(1-\tau^h) - p$ from formula (1).

[17] From (1) the entries of intra-marginal profits are $MRR_R^h = \rho_E \gamma^h / \hat{\theta}(1-\tau^h) - p$.

The following are the major observations from Tables 2A-C and Table 1.

Ownership categories (i), (iia), (iii):

a. Injecting the h-country intra-marginal profits as initial equity to the f-country carries over one percentage point higher cost of capital MRR_A^f than their reinvestment in the h-country. Extending the initiation of dividend repatriations from 10 to 20 years decreases MRR_A^f with 0.7 of a percentage point. Those parent companies (iib) that would face equalization tax upon onward distribution of the required returns on initial equity stakes have a two to three percentage points higher cost of capital. Without equalization tax the cost of capital for the initial f-equity and for marginal f-profits MRR_A^f is independent of the ownership structure as in the case of h-country intra-marginal profits (Table 1). A world inflation rate $p = 0.02$ raises the initial cost of capital MRR_A^f in the f-country with 0.7 of a percentage point.

b. The f-country cost of capital MRR_R^f for intra-marginal f-profits varies across the ownership structure, being the higher the higher is the h-country opportunity cost of intra-marginal profits (i.e. a higher tax preference for dividends therein and hence having a lower h-country cost of capital for funds from new share issues). In case of ownership categories (i) and (iii), i.e. *classical corporation tax systems*, the cost of capital MRR_R^f is three to four percentage points lower than the cost of capital of such funds for reinvestment of in the h-country[18] while in case of ownership categories (iia-b), i.e. *imputation systems,* MRR_R^f is only marginally lower than repatriating and reinvesting intra-marginal f-profits in the h-country though such undistributed profits are not taxed in the foreign country. The last thing also implies that world inflation does not affect MRR_R^f .

c. Investing the parent's h-country taxed profits in the form of internal group debt to the f-country and immediately repatriating interest income has an over one and half percentage points lower cost of capital MRR_D^f than equity injection MRR_A^f (and of course a further lower one if the risk premium for debt is assumed lower than for equity) though tax is paid immediately in the h-country for repatriated interest income. Due to the Balassa-

[18] Kari and Ylä-Liedenpohja (2003, p.9) argue repatriated intra-marginal foreign profits to have the same cost of capital in the h-country as the one of the h-country intra-marginal profits because the payment of the

Samuelson effect that represents a real gain to the h-country parent, MRR_D^f is also lower than MRR_R^h, the cost of capital for the parent's h-country intra-marginal profits therein.

Ownership categories (iva-b):

d. The f-country cost of capital is always the lowest for those closely-held companies which would otherwise allocate the funds to dividends taxed as earned income, implying the lowest opportunity cost of h-country profits for these companies.

Exit via a trade sale:

e. Repatriating the f-country profits via the sale of the shares of the mature foreign subsidiary (a trade sale) has always a higher cost of capital, rising with the holding period[19], than the other forms of repatriations if such realization gains are taxed in the h-country of the parent, but approximately the same cost of capital as group debt to the f-country if realization gains on controlled foreign companies (CFC's) are not taxed in the h-country. In the latter regime, the seller pays tax only via a lower transaction value of the trade sale, because the buyer will start paying the corporate dividend tax in the future.

Dividends vs. other forms of repatriations:

f. As is standard in the tax capitalization framework, it pays always to defer all intra-marginal foreign profits and to repatriate as dividends the returns on such reinvestments. The benefits of deferring and reinvesting marginal profits are minor in the cost of capital, being of the same size during a 10 years' holding period as the inflation-cased increase in the cost of capital. Finally, if realization gains on CFC's are not taxed in the h-country, it matters little in respect of the 10 year holding period's cost of capital whether profit repatriation is immediate as interest on debt or deferred as a trade sale of the f-country subsidiary. In fact, extending the holding period increases the cost of capital of the latter. Though the starting motivation of our study was to apply the standard thinking of the economics of capital gains taxation (Vickrey 1939, Diamond 1975) to analyse the Estonian kind of tax holiday, we cannot find an unequivocal benefit from deferred profit repatriations, except for intra-marginal foreign profits. The reason is that the cake grows during the deferral period at the required rate of return under the assumed arbitrage.

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repatriation phase "dividend tax" accordingly increases the market valuation of such funds (the cost of capital side of the international trapped equity argument).

6. Conclusions

The separate roles of marginal and intra-marginal profit as sources of investment finance are faced when analysing the tax holiday offered by the corporate tax system of Estonia. Despite a zero rate of corporation tax on undistributed and reinvested profits, part of them are marginal reflecting the required rate of return on the initial equity injection from the parent to the subsidiary. The reinvestment of marginal profits carries therefore the full burden of repatriation taxes, and the initial underinvestment problem of Sinn (1993) also concerns all follow-up investments from marginal foreign profits.

The problem does not arise in a standard model of trapped equity in which new issues are not modelled and all profits are therefore intra-marginal down to the cost of capital of retained profits, given exogenous investment opportunities subject to diminishing marginal returns. We allow investment opportunities to expand over time while maintaining the assumption of diminishing marginal profitability within any period of time. Therefore, the Sinn-Hartman neutrality theorem holds true only in the case of intra-marginal profits.

An implication of the trapped equity tax capitalization hypothesis is that the ownership structure of the parent company does not matter for the cost of capital of domestic retention finance while it matters in the case of new share issue finance (Table 1, row one). In the international framework this means that it does not matter for the cost of capital of the initial foreign equity injection and of the marginal foreign profits while it matters for the one of intra-marginal foreign profits, a higher home-country tax preference for dividends raising such a cost of capital.

In all our derivations and calculations the parent's taxable profits in the home-country are treated as the source of outside funding of the foreign subsidiary. Only intra-marginal foreign profits enjoy clear deferral benefits.

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[19] Due to the numerical method of solving for MRR_S^f, its reported value may be unstable.

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Appendix: Derivation of the Real Rate of Asset Growth of a Foreign Subsidiary

In general, a tax-holiday country sets, a positive corporation tax rate τ^f. If such a rate is applied to the nominal income, the rate of real asset value growth in the f-country is more complicated than in Estonia where, in the case of intra-marginal profits, $g = MRR^f$ prevails assuming the constancy of the latter. As in the main text, assume

g = real rate of growth of the post-corporation tax asset value
$(MRR^f+\pi)Ae^{(g+\pi)t}$ = taxable nominal income at time t
$((1-\tau^f)MRR^f-\tau^f\pi)Ae^{(g+\pi)t}$ = real post-corporation tax capital gain in the f-country at time t

which define

(A1) $g = (1-\tau^f)MRR^f-\tau^f\pi$

in the general case. Thus $MRR^f = g$ holds true for the cost of capital of financing investments from intra-marginal profits in Estonia.

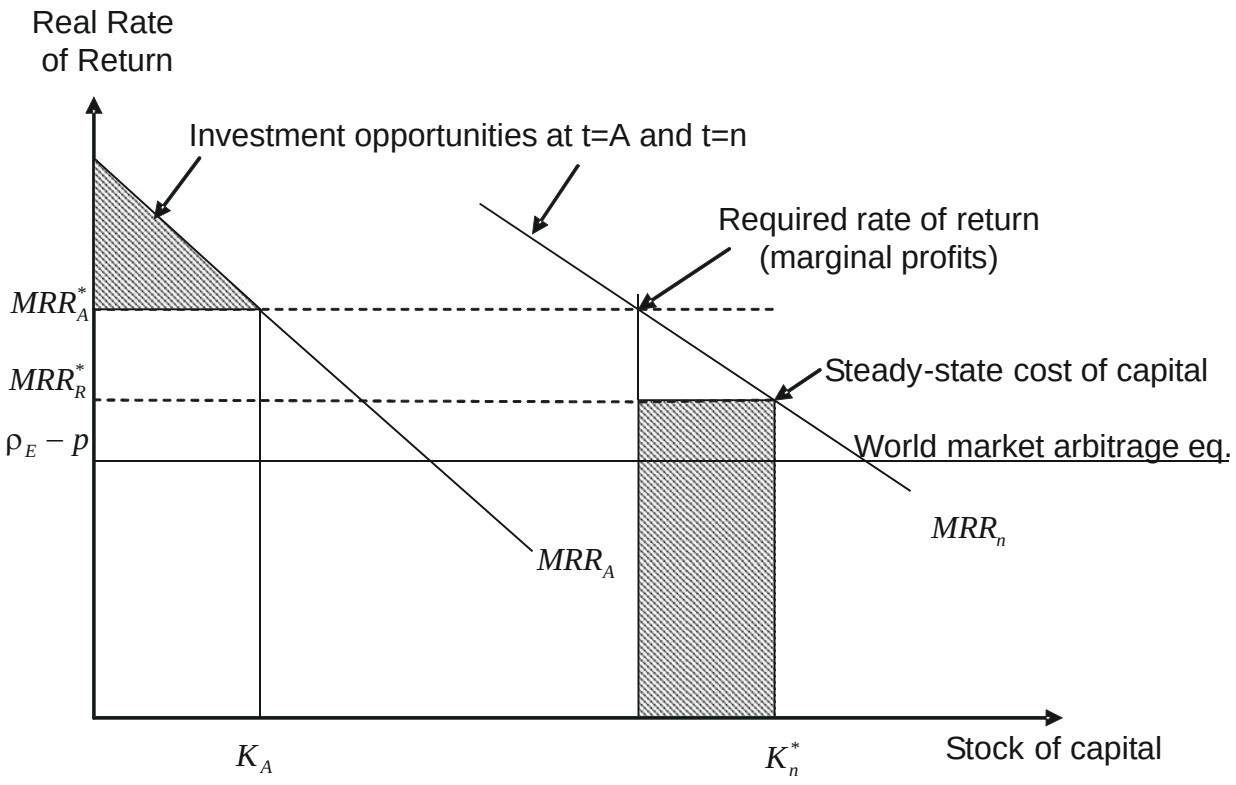

Figure 1. *Expansion of investment opportunities. The shaded areas describe the generation and reinvestment of intra-marginal profits*.

Repatriation in the form of	Equation		Ownership structure (i)		(iii)	
			Retention, years 10	20	Retention, years 10	20
Dividend	(3)	g_A*	0.078	0.073	0.078	0.073
	(3)	MRR_A^f	0.114	0.107	0.114	0.107
	(5)	MRR_R^f	0.062	0.062	0.075	0.075
Interest	(2)	MRR_D^f	0.098	0.098	0.098	0.098
Capital gain / trade sale	(9) τ^h>0	MRR_S^f	0,127	0,144	0,133	0,157
	(9) τ^h=0	MRR_S^f	0.099	0.112	0.100	0.119

Repatriation in the form of	Equation		Ownership structure (i)		(iii)	
			Retention, years 10	20	Retention, years 10	20
Dividend	(3)	g_A*	0.078	0.073	0.078	0.073
	(3)	MRR_A^f	0.107	0.100	0.107	0.100
	(5)	MRR_R^f	0.062	0.062	0.072	0.072
Interest	(2)	MRR_D^f	0.089	0.089	0.089	0.089
Capital gain / trade sale	(9) τ^h>0	MRR_S^f	0.124	0.147	0.132	0.161
	(9) τ^h=0	MRR_S^f	0.098	0.114	0.100	0.122

Table 2A. *Required rate of asset growth and cost of capital for an Estonian subsidiary, the source of outside funds being the parent's profits: upper panel inflation 2%, lower one 0%*

Repatriation in the form of	Equation		Ownership structure (iia)		(iib)	
			Retention, years 10	20	Retention, years 10	20
Dividend	(3)	g_A*	0.078	0.073	0.093	0.083
	(3)	MRR_A^f	0.114	0.107	0.135	0.121
	(5)	MRR_R^f	0.098	0.098	0.098	0.098
Interest	(2)	MRR_D^f	0.098	0.098	-	-
Capital gain / trade sale	(9) $\tau^h>0$	MRR_S^f	0.144	0.182	-	-
	(9) $\tau^h=0$	MRR_S^f	0.098	0.133	0.123	0.140

Repatriation in the form of	Equation		Ownership structure (iva)		(ivb)	
			Retention, years 10	20	Retention, years 10	20
Dividend	(3)	g_A*	0.061	0.062	0.075	0.071
	(3)	MRR_A^f	0.092	0.092	0.111	0.105
	(5)	MRR_R^f	0.058	0.058	0.058	0.058
Interest	(1)	MRR_D^f	0.058	0.058	-	-
Capital gain / trade sale	(9) $\tau^h>0$	MRR_S^f	0.103	0.133	-	-
	(9) $\tau^h=0$	MRR_S^f	0.077	0.099	0.096	0.108

Table 2B*. Required rate of asset growth and cost of capital for an Estonian subsidiary, the source of outside funds being the parent's profits: inflation 2%.*

Repatriation in the form of	Equation		Ownership structure (iia)		(iib)	
			Retention, years 10	20	Retention, years 10	20
Dividend	(3)	g_A*	0.078	0.073	0.093	0.083
	(3)	MRR_A^f	0.107	0.100	0.128	0.114
	(5)	MRR_R^f	0.089	0.089	0.089	0.089
Interest	(2)	MRR_D^f	0.089	0.089	-	-
Capital gain / trade sale	(9) $\tau^h>0$	MRR_S^f	0.146	0.186	-	-
	(9) $\tau^h=0$	MRR_S^f	0.100	0.137	0.124	0.144

Repatriation in the form of	Equation		Ownership structure (iva)		(ivb)	
			Retention, years 10	20	Retention, years 10	20
Dividend	(3)	g_A*	0.061	0.062	0.075	0.071
	(3)	MRR_A^f	0.085	0.085	0.104	0.098
	(5)	MRR_R^f	0.059	0.059	0.059	0.059
Interest	(1)	MRR_D^f	0.059	0.059	-	-
Capital gain / trade sale	(9) $\tau^h>0$	MRR_S^f	0.099	0.136	-	-
	(9) $\tau^h=0$	MRR_S^f	0.076	0.101	0.095	0.110

Table 2C. *Required rate of asset growth and cost of capital for an Estonian subsidiary, the source of outside funds being the parent's profits: inflation 0%.*